

An Analysis of the Expected Demand for Wood Pellet Fueled Residential Boilers

The demand estimates in this analysis are based on a maximum \$6000 tax credit on qualifying residential wood pellet boilers that are used to replace thermal energy from heating-oil fueled boilers.

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for the BioMass Thermal Energy Council

What is expected in the residential sector for pellet fueled boilers?

The forecasts for sales for pellet fueled residential boiler systems are based on European data where the market has matured (there was more than 4.4 million tons of pellet fuel was consumed in more than a half a million residential pellet boilers in 2008 in Europe¹). The European data also provides some understanding of the degree to which government incentives have influenced demand.

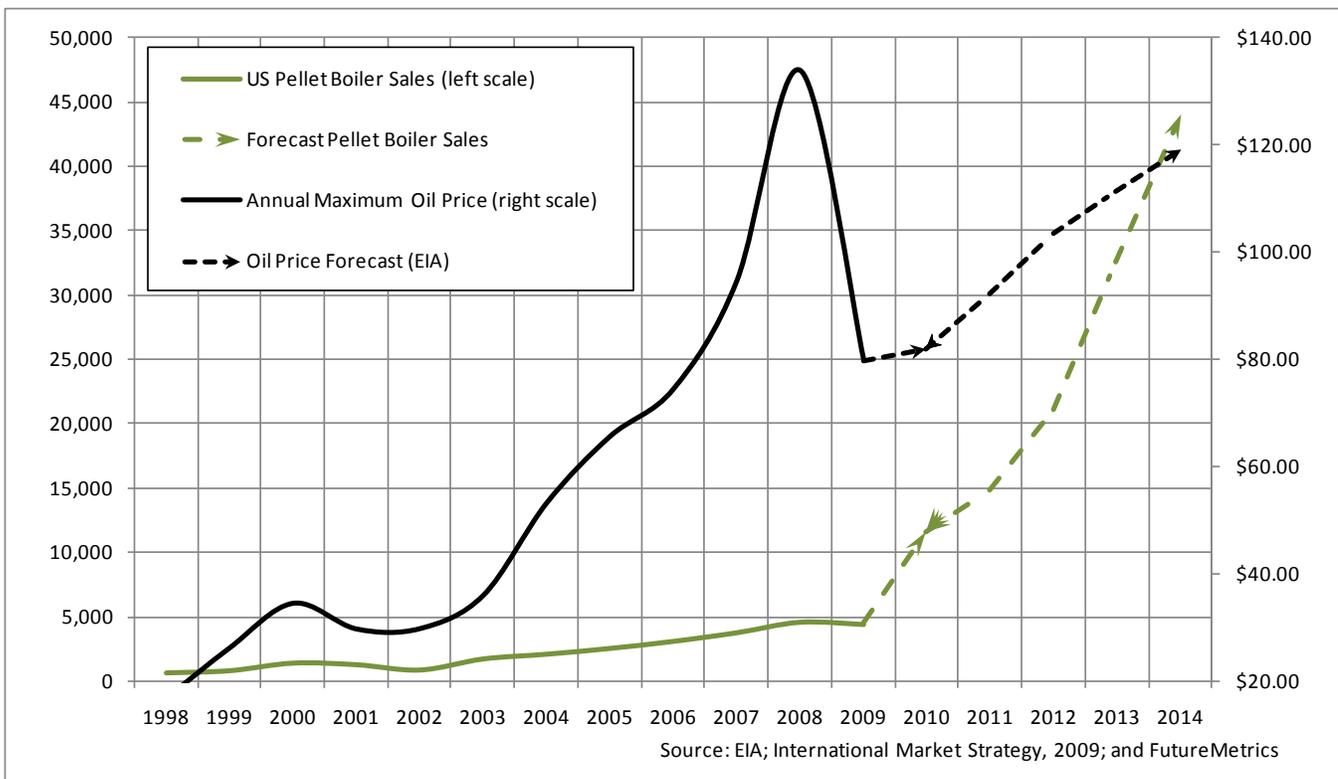
The growth of the residential pellet boiler market is limited by several factors. If a home has access to natural gas, the fuel cost savings effect is minimal and it is unlikely that conversion will occur. For this analysis, it is assumed that the majority of homes in urban locations, as defined by the US Census, do have access to natural gas. Furthermore, most heating systems have a useful life of 20 years. So given the growth in housing in the past 20 years, it is estimated that about 3.998% of the installed base will be ready for replacement in the first year (2009) and about 4.192% in the fifth year (2013). Finally, based on recent market research undertaken in Maine², it is estimated that about 14.5% of homes that are ready for heating systems replacement will convert if there is no cost difference between a heating oil system and a pellet system (essentially the outcome of a \$6000 tax credit). This estimate provides a baseline expectation for the number of new residential pellet boiler systems in the first year at about 5,600.

¹ Pelletsatlas.com and Intelligent Energy Europe, 2008.

² Maine Energy Systems, August, 2009.

The growth rate of demand for pellet fueled residential heating systems is modeled after the growth rate of the European market. From 2002 to 2008 residential demand in Europe grew at an annualized rate of 25.51%³. This growth rate coincides with a number of policies that subsidized the purchase of pellet boilers (and penalized the use of fossil fuel)⁴. The data is not conclusive as to how much of the growth was due to subsidies and tax credits and how much was due to carbon taxes and cap and trade in the EU. For this analysis it is assumed that only the tax credit effect stimulates US domestic growth (it is uncertain at this time if cap and trade will be implemented). Based on the limited European data it is estimated that tax credits of \$6000 per system will result in an average annual growth rate of 15.4% over the next 5 years in the US market for residential pellet fuel central heating systems. However it is also estimated that the rising price of heating oil will also stimulate demand. Based on the pellet stove data, that will add an average of an additional 12.78% to the annualized growth rate. The oil price effect depends on the gap in fuel prices and thus will be very low in year one and will increase to its maximum in year 5. The significant simulative effect of the 30% tax credit (capped at \$6,000) is also a part of the growth forecast model.

The historical sales⁵ and the forecast sales are shown in the chart below along with historical and forecast petroleum prices.



³ Data from the EU's Intelligent Energy Program. The growth was from 137,000 homes to 538,000 homes.

⁴ Based on research by IEA Bioenergy Task 40.

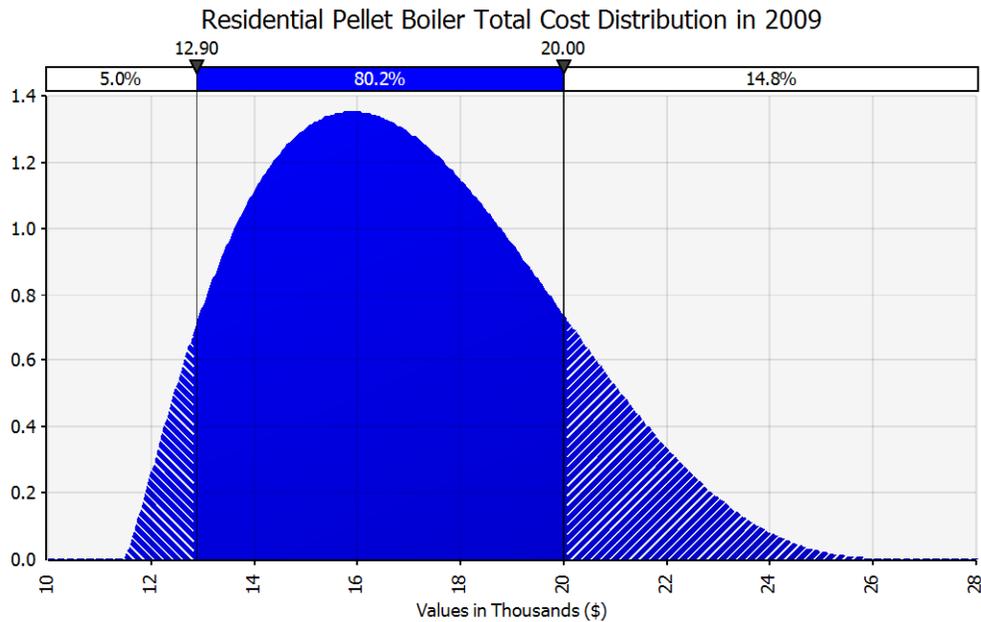
⁵ Estimated from sales data from Biomass Thermal Energy Council members. Current estimated installed base is 27,000 residential pellet fueled boilers.

Installed Price Estimates for Equipment and Aggregate Estimated Total of Tax Credits

This analysis makes some fundamental assumptions on the timing of the cash flows. The actual timing will not neatly fall into a given calendar year. However, over time, the net amounts will be correct given the expected growth in the fuel usage cohorts. This analysis also does not consider state or local tax effects.

The analysis begins with estimates of the costs of the systems and the expected fuel consumption. The cost of the equipment plus installation costs are shown in the table below⁶. The total cost per system is expected to decline as domestic production of systems increases (currently all systems are imported from Europe). That change in installed cost is assumed to be an annual price decrease of 3% per year⁷.

Based on current data on residential boilers in sizes that will meet demand across the full cross section of home sizes and maximum heat losses, the average systems will cost about \$16,865 to for all necessary components and installation costs. As the chart below shows, about 14.8% of the systems will exceed \$20,000 and therefore will reach the full \$6,000 cap. The median system will use about \$5,060 in total tax credits.



⁶ Cost and consumption data from Pellet Fuels Institute, New England Wood Pellet, Maine Energy Systems, Propell Energy, New England Energy Solutions, Thayer Corporation, BioHeatUSA. See table at the back for more detail.

⁷ Based on information from several pellet boiler distributors who have licenses to produce systems in the US.

The expected growth in the market and the total pellet fuel required to meet the new demand is shown in the table below.

	2010	2011	2012	2013	2014
Residential Pellet Boiler					
New Homes	5,600	11,600	14,900	21,100	32,600
Total Homes	5,600	17,200	32,100	53,200	85,800
New Domestic Fuel Need per Year in Tons	44,800	92,800	119,200	168,800	260,800

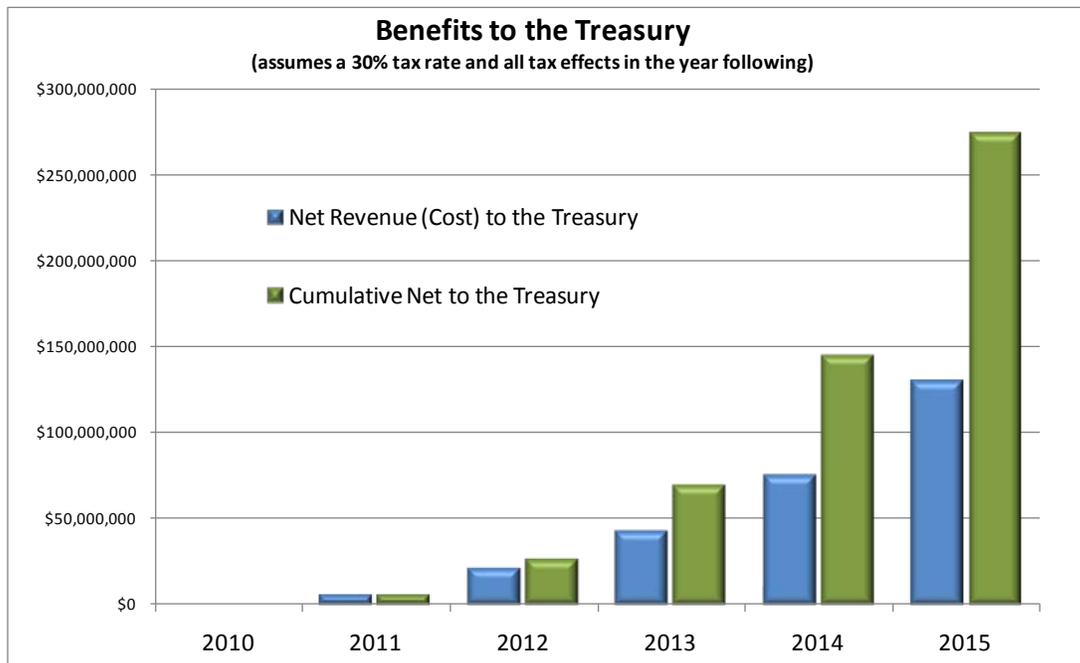
The tax credits' costs are assumed to be realized in the year following accrual. The following table shows the estimated annual amounts of tax credits.

Amount of Tax Credits (recognized one year following)	2010	2011	2012	2013	2014	2015
Residential Pellet Boiler		\$28,448,000	\$57,160,000	\$71,219,000	\$97,828,000	\$146,612,000

The table on the last page shows the estimated net tax effects based on the assumption that all tax costs and all tax revenues associated with the income produced from the commerce associated with the sale and installation of the equipment, the sale of domestically produced fuel, and the additional commerce created from the fuel savings adding to disposable income happen in the year following⁸.

The values for some of the equipment sales are adjusted to reflect the average proportion of the equipment that is manufactured non-domestically and therefore does not create domestic income (and therefore income taxes). The fuel sales income calculation includes an adjustment for the loss of income to the regional heating oil contractors. The fuel savings calculation assumes that 95% of the aggregate savings in fuel costs are used for either consumption or investment. The assumed tax rate is 30%.

The chart below summarizes the net revenue and the cumulative net revenue to the treasury. Using the assumptions outlined above, the policy is self funded from year one.

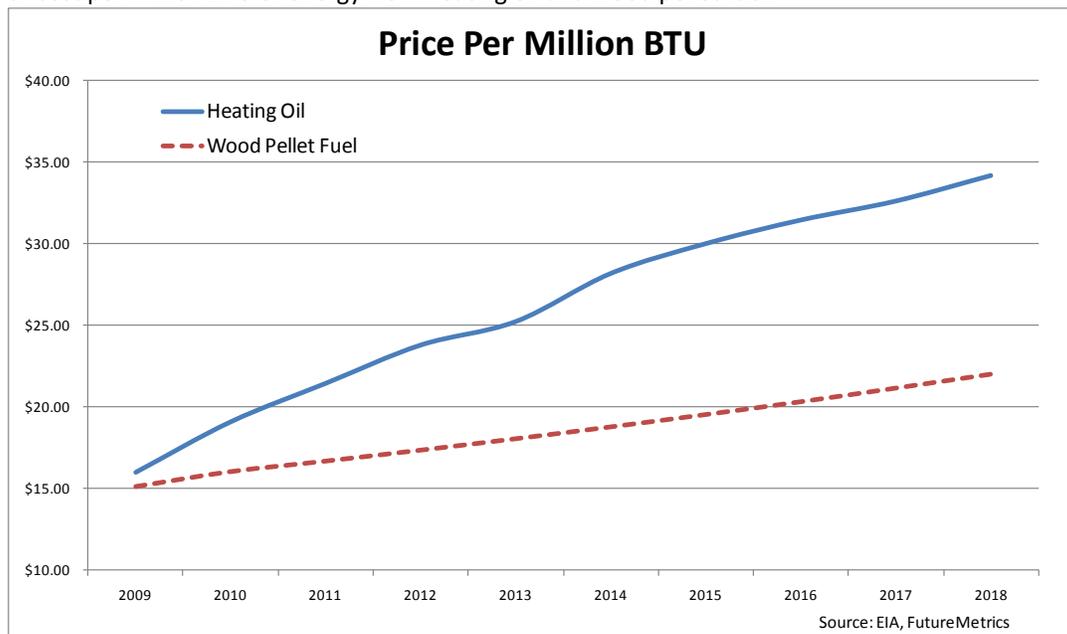


⁸ The multiplier effects from not sending hundreds of millions of dollars spent on heating oil out of the country are substantial. In this analysis the multiplier is assumed to be 1.5.

There are also significant job growth effects from the increased commerce primarily from two effects. The cost of heating homes will be significantly lower as oil prices increase but pellet fuel prices increase at a much slower rate⁹. That savings will become disposable income and will circulate in the economy and create new commerce and tax revenues. Also, the effects of having the money spent on fuel remain in the domestic economy rather than being exported to foreign nations has significant simulative effects that will also create new commerce and tax revenues.

	2009	2010	2011	2012	2013
New Tons of Pellet Production due to New Residential Pellet Boilers	44,800	92,800	119,200	168,800	260,800
Amount NOT spent on Heating Oil	\$13,160,000	\$48,160,000	\$99,510,000	\$174,686,000	\$298,732,000
Amount Spent on Pellet Fuel	\$11,872,000	\$37,923,000	\$73,605,000	\$126,867,000	\$212,793,000
Amount Saved by Using Pellet Fuel	\$1,288,000	\$10,237,000	\$25,905,000	\$47,819,000	\$85,939,000
Wood Supply and Pellet Fuel Making and Delivery Jobs	210	440	560	790	1,230
Home Heating and Boiler Plant Jobs	40	70	100	140	210
Multiplier Effect Jobs	1,110	2,300	2,960	4,190	6,470
Total Jobs	1,360	2,810	3,620	5,120	7,910

⁹ Based on EIA estimates and analysis by FutureMetrics, the cost advantage of wood pellet fuel is shown in this chart that plots the dollar cost per million BTU of energy from heating oil and wood pellet fuel.



Analysis of Taxable Cash Flow	2010	2011	2012	2013	2014	2015	2016
Purchase and Installation (net of value added)							
Residential Boiler Sales under the Tax Credit Policy	\$65,772,000	\$134,797,000	\$171,310,000	\$240,021,000	\$366,908,000	\$0	\$0
Purchases of Wood Pellet Fuel	\$11,872,000	\$37,923,000	\$73,605,000	\$126,867,000	\$212,793,000	\$221,304,000	\$230,156,000
78% of Fuel Purchase that is Incremental Addition	\$9,260,000	\$29,580,000	\$57,412,000	\$98,956,000	\$165,979,000	\$172,617,000	\$179,522,000
Savings on Fuel that Creates New Commerce	\$1,224,000	\$9,725,000	\$24,610,000	\$45,428,000	\$81,642,000	\$106,639,000	\$118,706,000
New Tax Revenue (1.5X Multiplier)	\$0	\$34,315,200	\$78,345,900	\$113,999,400	\$172,982,250	\$276,538,050	\$125,665,200
Amount of Tax Credits	\$0	\$28,448,000	\$57,160,000	\$71,219,000	\$97,828,000	\$146,612,000	\$0
Net Revenue (Cost) to the Treasury	\$0	\$5,867,200	\$21,185,900	\$42,780,400	\$75,154,250	\$129,926,050	\$125,665,200